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January 1999

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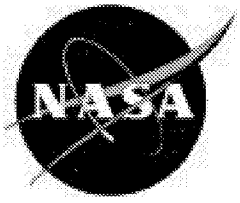

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Introduction

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The *NASA Patent Abstracts Bibliography* is a semiannual NASA publication containing comprehensive abstracts of NASA owned inventions covered by U.S. patents and applications for patent. The citations included in the bibliography arrangement of citations were originally published in NASA's *Scientific and Technical Aerospace Reports (STAR)* and cover *STAR* announcements made since May 1969.

The citations published in this issue cover the period June 1998 through December 1998. This issue includes 10 major subject divisions separated into 76 specific categories and one general category/division. (See Table of Contents for the scope note of each category, under which are grouped appropriate NASA inventions.) This scheme was devised in 1975 and revised in 1987 in lieu of the 34 category divisions which were utilized in supplements (01) through (06) covering *STAR* abstracts from May 1969 through January 1974. Each entry consists of a *STAR* citation accompanied by an abstract and, when appropriate, a key illustration taken from the patent or application for patent. Entries are arranged by subject category in ascending order.

A typical citation and abstract presents the various data elements included in most records cited. This appears after the table of contents.

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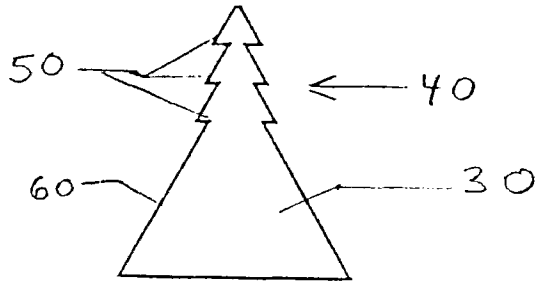
Typical Report Citation and Abstract

❶ 19970011223 NASA Langley Research Center, Hampton, VA USA
❷ Serrated-Planform Lifting-Surfaces
❸ McGrath, Brian E., Inventor, NASA Langley Research Center, USA; Wood, Richard M., Inventor, NASA Langley Research
❹ Center, USA; Oct. 22, 1996; 38p; In English
❺ Patent Info.: Filed 22 Oct. 1996; NASA-Case-LAR-15295-1; US-Patent-Appl-SN-734820
❻ Report No.(s): NAS 1.71:LAR-15295-1; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche
❼ A set of serrated-planform lifting surfaces is provided which produces unexpectedly high lift coefficients at moderate to high angles-of-attack. Each serration, or tooth, is designed to shed a vortex. The interaction of the vortices greatly enhances the lifting capability over an extremely large operating range. Variations of the invention use serrated-planform lifting surfaces in planes different than that of a primary lifting surface. In an alternate embodiment, the individual teeth are controllably retractable and deployable to provide for active control of the vortex system and hence lift coefficient. Differential lift on multiple serrated-planform lifting surfaces provides an means for vehicle control. The important aerodynamic advantages of the serrated-planform lifting surfaces are not limited to aircraft applications but can be used to establish desirable performance characteristics for missiles, land vehicles, and/or watercraft.
❽ NASA
❾ *Angle of Attack; Lift; Vortex Shedding; Active Control; Lifting Bodies*

❿



Key

1. Document ID Number; Corporate Source
2. Title
3. Author(s) and Affiliation(s)
4. Publication Date
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7. Abstract
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10. Patent Illustration

NASA PATENT ABSTRACTS BIBLIOGRAPHY

A Continuing Bibliography (Suppl. 54)

JANUARY 1999

18
SPACECRAFT DESIGN, TESTING AND PERFORMANCE

Includes satellites; space platforms; space stations; spacecraft systems and components such as thermal and environmental controls; and attitude controls. For life support systems see 54 Man/System Technology and Life Support. For related information see also 05 Aircraft Design, Testing and Performance, 39 Structural Mechanics, and 16 Space Transportation.

19980204846 NASA Johnson Space Center, Houston, TX USA

Method and Apparatus for Coupling Space Vehicles

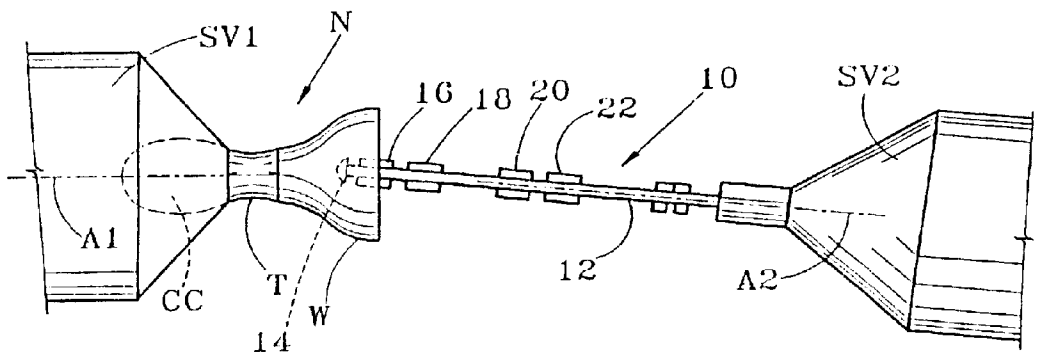
Schneider, William C., Inventor, NASA Johnson Space Center, USA; Apr. 07, 1998; 7p; In English

Patent Info.: Filed 28 May 1996; NASA-Case-MSC-22745-1; US-Patent-5,735,488; US-Patent-Appl-SN-654460; No Copyright; Avail: US Patent and Trademark Office, Hardcopy, Microfiche

A first space vehicle is attached with a second space vehicle which includes a rocket propulsion nozzle having a combustion chamber upstream from the nozzle throat. Apparatus 10 includes an elongate grappling arm 12 extending from the first space vehicle, a pair of inflatable bladders 16, 18 positioned about the grappling arm for engaging an inner surface of the combustion chamber upon inflation. and a pair of rear bladders 20, 22 positioned about the grappling arm for engaging an inner surface of the nozzle downstream from the combustion chamber upon inflation for aligning the grappling arm and the rocket propulsion nozzle. A pressurized fluid source 24 is provided on the first space vehicle for supplying fluid pressure to the inflatable bladders. and a fluid control valve manifold 30 selectively controls the release of pressurized fluid to the bladders. According to the method of the invention. the grappling arm is inserted into the rocket propulsion nozzle. and the control valves are actuated to first inflate the front bladders and thereby interconnect the grappling arm and the rocket propulsion nozzle. The rear bladders are subsequently inflated to align a central axis of the grappling arm with a central axis of the rocket propulsion nozzle. Inflation of the rear bladders provides an axial reaction load to balance the axial load provided by the front bladders. Attaching the vehicles in space may be controlled from the earth by activating the control valves to inflate the bladders. The cost of attaching space vehicles is significantly reduced by attaching a grappling arm on one vehicle with the existing rocket propulsion nozzle of another vehicle.

Author

Couplings; Rocket Nozzles; Propulsion; Fluid Pressure; Spacecraft



20
SPACECRAFT PROPULSION AND POWER

Includes main propulsion systems and components, e.g., rocket engines; and spacecraft auxiliary power sources. For related information see also 07 Aircraft Propulsion and Power, 28 Propellants and Fuels, 44 Energy Production and Conversion, and 15 Launch Vehicles and Space Vehicles.

19980204857 NASA Lewis Research Center, Cleveland, OH USA

Ion Thruster Support and Positioning System

Haag, Thomas W., Inventor, NASA Lewis Research Center, USA; Apr. 14, 1998; 12p; In English

Patent Info.: Filed 24 Jun. 1996; NASA-Case-LEW-16104-1; US-Patent-5,738,308; US-Patent-Appl-SN-695685; No Copyright; Avail: US Patent and Trademark Office, Hardcopy, Microfiche

A system for supporting and selectively positioning an ion thruster relative to a surface of a spacecraft includes three angularly spaced thruster support assemblies. Each thruster support assembly includes a frame which has a rotary actuator mounted thereon. The rotary actuator is connected to an actuator member which is rotatably connected to a thruster attachment member connected to a body of the thruster. A stabilizer member is rotatably mounted to the frame and to the thruster attachment member. The thruster is selectively movable in the pitch and yaw directions responsive to movement of the actuator members by the actuators on the thruster support assemblies. A failure of any one actuator on a thruster support assembly will generally still enable limited thruster positioning capability in two directions. In a retracted position the thruster attachment members are held in nested relation in saddles supported on the frames of the thruster support assemblies. The thruster is securely held in the retracted position during periods of high loading such as during launch of the spacecraft.

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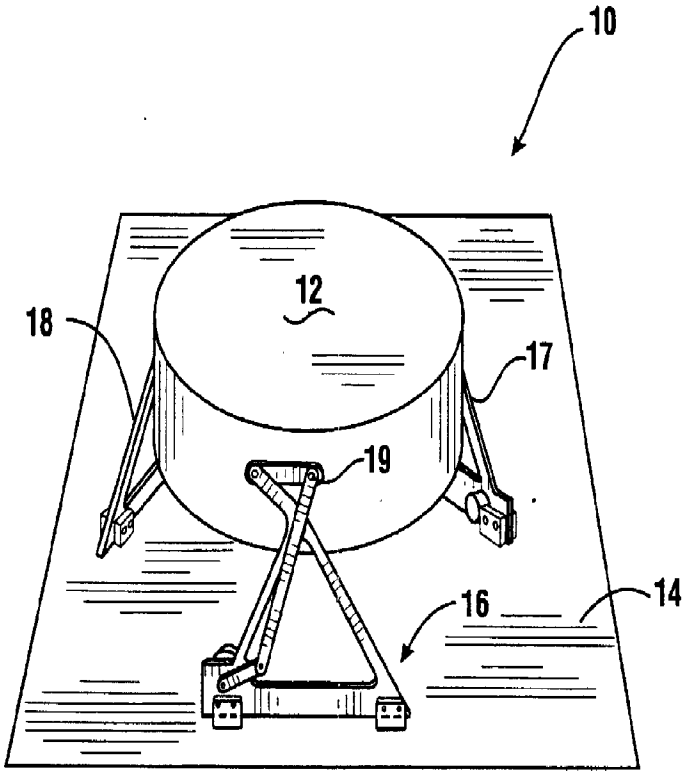
Ion Engines; Support Systems; Rocket Engines



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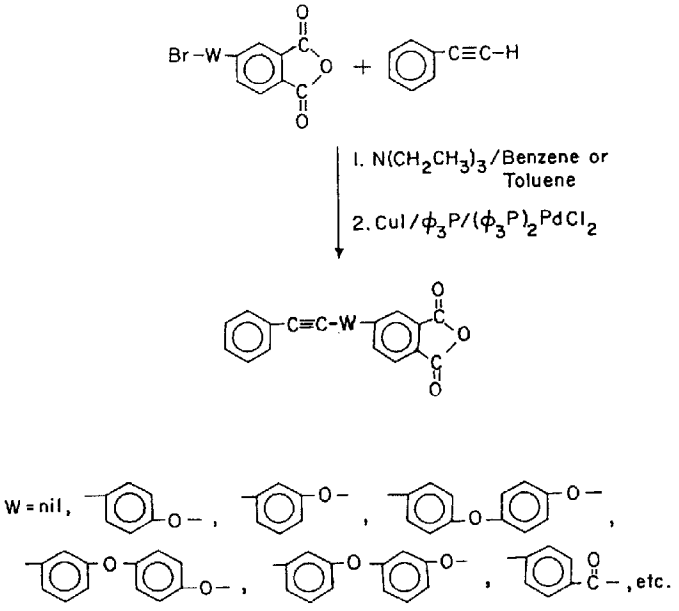
CHEMISTRY AND MATERIALS (GENERAL)

19980204848 NASA Langley Research Center, Hampton, VA USA
Imide Oligomers Endcapped with Phenylethynl Phthalic Anhydrides and Polymers Therefrom
Hergenrother, Paul M., Inventor, NASA Langley Research Center, USA; Smith, Joseph G., Jr., Inventor, NASA Langley Research Center, USA; Jun. 02, 1998; 16p; In English; Continuation of US-Patent-Appl-SN-330773, filed 28 Oct. 1994
Patent Info.: Filed 21 Oct. 1996; NASA-Case-LAR-15176-4-CU; US-Patent-5,760,168; US-Patent-Appl-SN-734286; US-Patent-Appl-SN-330773; No Copyright; Avail: US Patent and Trademark Office, Hardcopy, Microfiche

Controlled molecular weight phenylethynyl terminated imide oligomers (PETIs) have been prepared by the cyclodehydration of precursor phenylethynyl terminated amic acid oligomers. Amino terminated amic acid oligomers are prepared from the reaction of dianhydride(s) with an excess of diamine(s) and subsequently endcapped with phenylethynyl phthalic anhydride(s) (PEPA). The polymerizations are carried out in polar aprotic solvents such as N-methyl-2-pyrrolidinone or N.N-dimethylacetamide under nitrogen at room temperature. The amic acid oligomers are subsequently cyclodehydrated either thermally or cheznicauy to the corresponding imide oligomers. Direct preparation of PETIs from the reaction of dianhydxide(s) with an excess of diamine(s) and endcapped with phenylethynyl phthalic anhydride(s) has been performed in m-cresol. Phenylethynyl phthalic anhydrides are synthesized by the palladium catalyzed reaction of phenylacetylene with bromo substituted phthalic anhydrides in triethylamine. These new materials exhibit excellent properties and are potentially useful as adhesives, coatings, films, moldings and composite matrices.
Author
Amino Acids; Anhydrides; Cresols; Matrix Materials; Methyl Compounds; Molecular Weight; Cyclic Compounds



24
COMPOSITE MATERIALS

Includes physical, chemical, and mechanical properties of laminates and other composite materials. For ceramic materials see 27 Nonmetallic Materials.

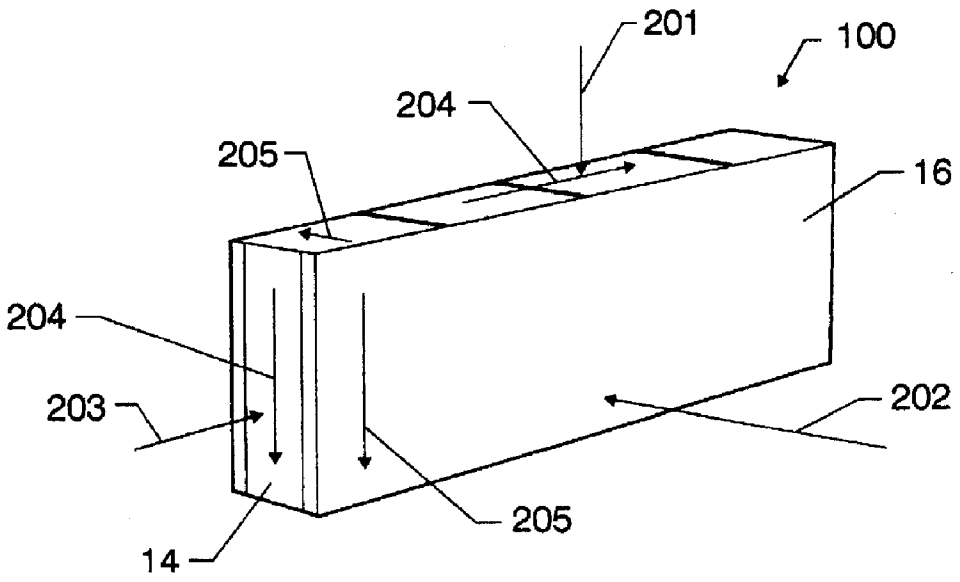
19980203097 NASA Langley Research Center, Hampton, VA USA
Crash-Energy Absorbing Composite Structure and Method of Fabrication
Kellas, Sotiris, Inventor, NASA Langley Research Center, USA; Carden, Huey D., Inventor, NASA Langley Research Center, USA; May 05, 1998; 8p; In English

Patent Info.: Filed 20 Mar. 1996; NASA-Case-LAR-15397-1; US-Patent-5,746,537; US-Patent-Appl-SN-624843; No Copyright; Avail: US Patent and Trademark Office, Hardcopy, Microfiche

A stand-alone, crash-energy absorbing structure and fabrication method are provided. A plurality of adjoining rigid cells are each constructed of resin-cured fiber reinforcement and are arranged in a geometric configuration. The geometric configuration of cells is integrated by means of continuous fibers wrapped thereabout in order to maintain the cells in the geometric configuration. The cured part results in a net shape, stable structure that can function on its own with no additional reinforcement and can withstand combined loading while crushing in a desired direction.

Official Gazette of the U.S. Patent and Trademark Office

Composite Structures; Fabrication; Fiber Composites; Energy Absorption; Resin Matrix Composites



25
INORGANIC AND PHYSICAL CHEMISTRY

Includes chemical analysis, e.g., chromatography; combustion theory; electrochemistry; and photochemistry. For related information see also 77 Thermodynamics and Statistical Physics.

19980203084 NASA Stennis Space Center, Bay Saint Louis, MS USA

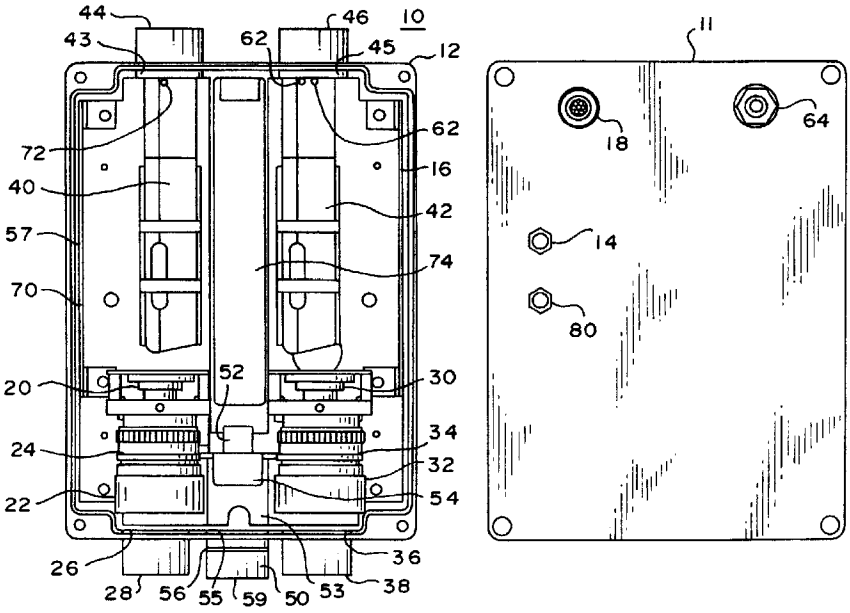
Flame Imaging System

Barnes, Heidi L., Inventor, NASA Stennis Space Center, USA; Smith, Harvey S., Inventor, NASA Stennis Space Center, USA; Mar. 10, 1998; 6p; In English

Patent Info.: Filed 13 Mar. 1996; NASA-Case-SSC-00040; US-Patent-5,726,632; US-Patent-Appl-SN-622178; No Copyright; Avail: US Patent and Trademark Office, Hardcopy, Microfiche

A system for imaging a flame and the background scene is discussed. The flame imaging system consists of two charge-coupled-device (CCD) cameras. One camera uses a 800 nm long pass filter which during overcast conditions blocks sufficient background light so the hydrogen flame is brighter than the background light, and the second CCD camera uses a 1100 nm long pass filter, which blocks the solar background in full sunshine conditions such that the hydrogen flame is brighter than the solar background. Two electronic viewfinders convert the signal from the cameras into a visible image. The operator can select the appropriate filtered camera to use depending on the current light conditions. In addition, a narrow band pass filtered InGaAs sensor

at 1360 nm triggers an audible alarm and a flashing LED if the sensor detects a flame, providing additional flame detection so the operator does not overlook a small flame.
Official Gazette of the U.S. Patent and Trademark Office
Flames; CCD Cameras; Imaging Techniques; Bandpass Filters

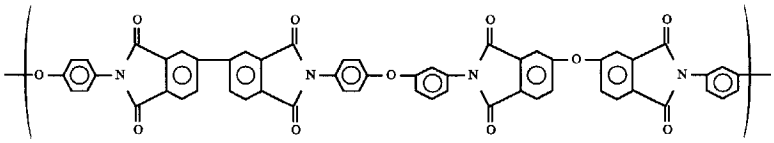


27
NONMETALLIC MATERIALS

Includes physical, chemical, and mechanical properties of plastics, elastomers, lubricants, polymers, textiles, adhesives, and ceramic materials. For composite materials see 24 Composite Materials.

19980203089 NASA Langley Research Center, Hampton, VA USA
Tough, Soluble, Aromatic, Thermoplastic Copolyimides
Bryant, Robert G., Inventor, NASA Langley Research Center, USA; Apr. 21, 1998; 10p; In English
Patent Info.: Filed 16 Dec. 1994; NASA-Case-LAR-15205-1; US-Patent-5,741,883; US-Patent-Appl-SN-359752; No Copyright; Avail: US Patent and Trademark Office, Hardcopy, Microfiche

Tough, soluble, aromatic, thermoplastic copolyimides were prepared by reacting 4,4'-oxydiphthalic anhydride, 3,4,3',4'-biphenyltetracarboxylic dianhydride and 3,4'-oxydianiline. These copolyimides were found to be soluble in common amide solvents such as N,N'-dimethyl acetamide, N-methylpyrrolidinone, and dimethylformamide allowing them to be applied as the fully imidized copolymer and to be used to prepare a wide range of articles.
Official Gazette of the U.S. Patent and Trademark Office
Copolymers; Synthesis (Chemistry); Thermoplastic Resins; Polyimide Resins; Aromatic Compounds



19980203090 NASA Johnson Space Center, Houston, TX USA

Method and Apparatus for Production of Powders

Storltzfus, Joel M., Inventor, NASA Johnson Space Center, USA; Sircar, Subhasish, Inventor, NASA Johnson Space Center, USA; Apr. 14, 1998; 7p; In English; Division of US-Patent-Appl-SN-413732, filed 29 Mar. 1995

Patent Info.: Filed 17 Jan. 1997; NASA-Case-MSC-22358-2; US-Patent-5,738,830; US-Patent-Appl-SN-785500; US-Patent-Appl-SN-413732; No Copyright; Avail: US Patent and Trademark Office, Hardcopy, Microfiche

Apparatus and method are disclosed for producing oxides of metals and of metal alloys. The metal or alloy is placed in an oxygen atmosphere in a combustion chamber and ignited. Products of the combustion include one or more oxides of the metal or alloy in powdered form. In one embodiment of the invention a feeder is provided whereby material to be oxidized by combustion can be advanced into a combustion chamber continuously. A product remover receives the powder product of the combustion.

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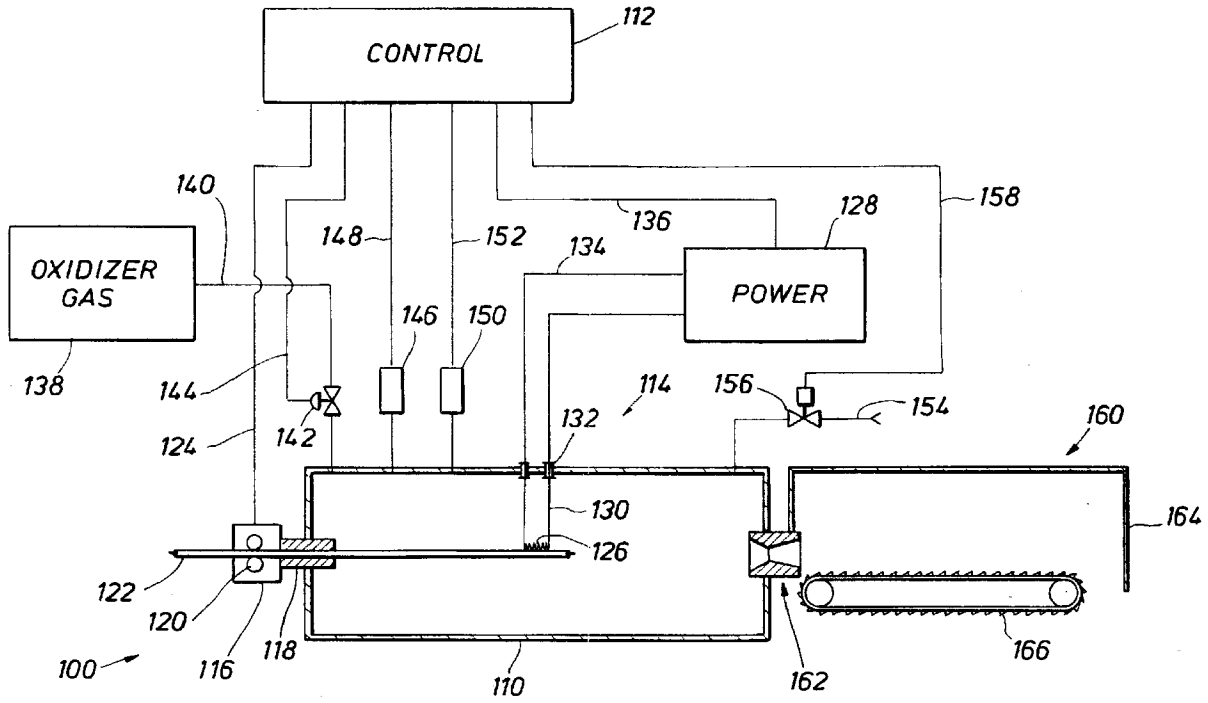
Metal Oxides; Metal Powder; Combustion; Production Engineering



19980203166 NASA Langley Research Center, Hampton, VA USA

Method of Forming a Composite Coating with Particle Materials that are Readily Dispersed in a Sprayable Polyimide Solution

Tran, Sang Q., Inventor, NASA Langley Research Center, USA; May 19, 1998; 4p; In English

Patent Info.: Filed 11 Sep. 1996; NASA-Case-LAR-15369-1; US-Patent-5,753,306; US-Patent-Appl-SN-712529; No Copyright; Avail: US Patent and Trademark Office, Hardcopy, Microfiche

A method for creating a composite form of coating from a sprayable solution of soluble polyimides and particle materials that are uniformly dispersed within the solution is described. The coating is formed by adding a soluble polyimide to a solvent, then stirring particle materials into the solution. The composite solution is sprayed onto a substrate and heated in an oven for a period of time in order to partially remove the solvent. The process may be repeated until the desired thickness or characteristic of the coating is obtained. The polyimide is then heated to at least 495 F, so that it is no longer soluble.

Official Gazette of the U.S. Patent and Trademark Office

Coating; Composite Materials; Polyimides; Solvents; Sprayed Coatings

19980203168 NASA Kennedy Space Center, Cocoa Beach, FL USA

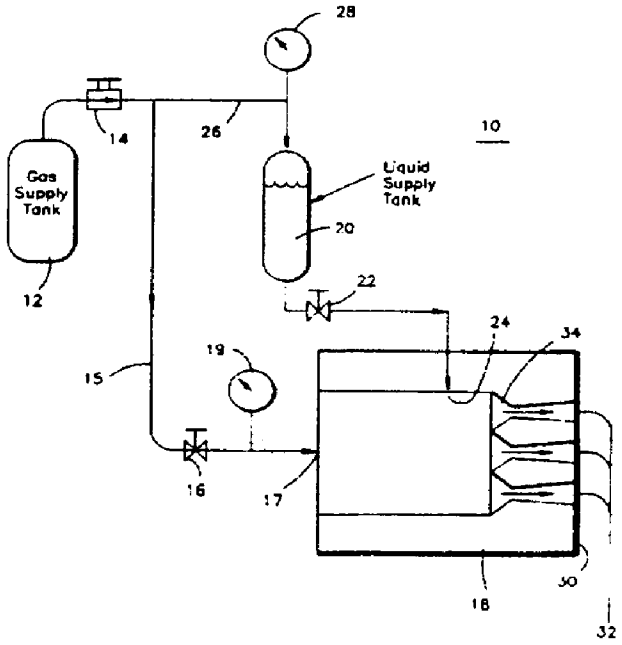
Gas-Liquid Supersonic Cleaning and Cleaning Verification Spray System

Caimi, Raoul E. B., Inventor, NASA Kennedy Space Center, USA; Lin, Feng-Nan, Inventor, NASA Kennedy Space Center, USA; Thaxton, Eric A., Inventor, NASA Kennedy Space Center, USA; Mar. 24, 1998; 6p; In English; Continuation of abandoned US-Patent-Appl-SN-116593, filed 30 Aug. 1993

Patent Info.: Filed 8 May 1995; NASA-Case-KSC-11641; US-Patent-5,730,806; US-Patent-Appl-SN-437859; US-Patent-Appl-SN-116593; No Copyright; Avail: US Patent and Trademark Office, Hardcopy, Microfiche

A gas-liquid cleaning spray system employs one or more converging-diverging nozzles to accelerate a gas-liquid mixture to a supersonic velocity for cleaning various types of articles, such as mechanical, electrical, and fluid components. The gas, such as air or nitrogen, is supplied at high pressure to a nozzle body where it is mixed with cleaning liquid, such as water or liquid detergent, which is supplied to the nozzle body at a relatively low flow rate. Acceleration of the gas-liquid mixture to a supersonic velocity eliminates the need for a high pressure, high flow rate, and high volume liquid supply. After the components are contacted with the gas-liquid mixture, the cleaning liquid can be recaptured and analyzed for cleanliness verification of the components. Official Gazette of the U.S. Patent and Trademark Office

Cleaning; Convergent-Divergent Nozzles; Spray Nozzles; Spraying; Cleaners; Liquid-Gas Mixtures; Gases; Sprayers



31
ENGINEERING (GENERAL)

Includes vacuum technology; control engineering; display engineering; cryogenics; and fire prevention.

19980202940 NASA Ames Research Center, Moffett Field, CA USA

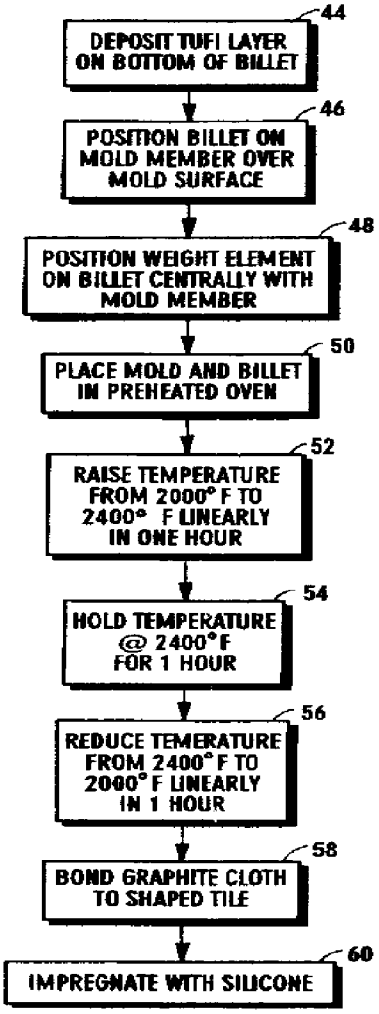
Method for Molding Planar Billet of Thermally Insulative Material Into Predetermined Non-Planar Shape

Kolodziej, Paul, Inventor, NASA Ames Research Center, USA; Carroll, Joe A., Inventor, NASA Ames Research Center, USA; Smith, Dane, Inventor, NASA Ames Research Center, USA; Jan. 06, 1998; 5p; In English

Patent Info.: NASA-Case-ARC-14051-1-SB; US-Patent-5,705,012; US-Patent-Appl-SN-644630; No Copyright; Avail: US Patent and Trademark Office, Hardcopy, Microfiche

A method and apparatus is discussed for molding thermal protection system (TPS) tiles for spacecraft. The apparatus and method include a bottom mold member defining a mold surface shaped like a surface of the spacecraft, e.g., the nose cap of wing leading edge, sought to be thermally protected. A flat billet of TPS material is positioned over the periphery of the mold surface, and a hollow weight element that has a periphery configured like the periphery of the mold surface is positioned on the billet. The

billet is then heated in accordance with a predetermined heating regime, and during the heating process the weight of the weight element causes the billet to deform to assume the shape of the mold surface. If desired, a TUFI coating is impregnated into the billet prior to heating, and the coating is sintered to the billet during heating. After heating, a composite matrix material, e.g., a graphite or fiberglass cloth which is impregnated with epoxy or polimide, is bonded to the now-shaped tile to support the tile. Silicone can then be impregnated into the now-formed tile to provide flexibility of the tile.
Official Gazette of the U.S. Patent and Trademark Office
Thermal Protection; Casting; Molds; Tiles; Spacecraft Construction Materials; Composite Materials; Ablative Materials

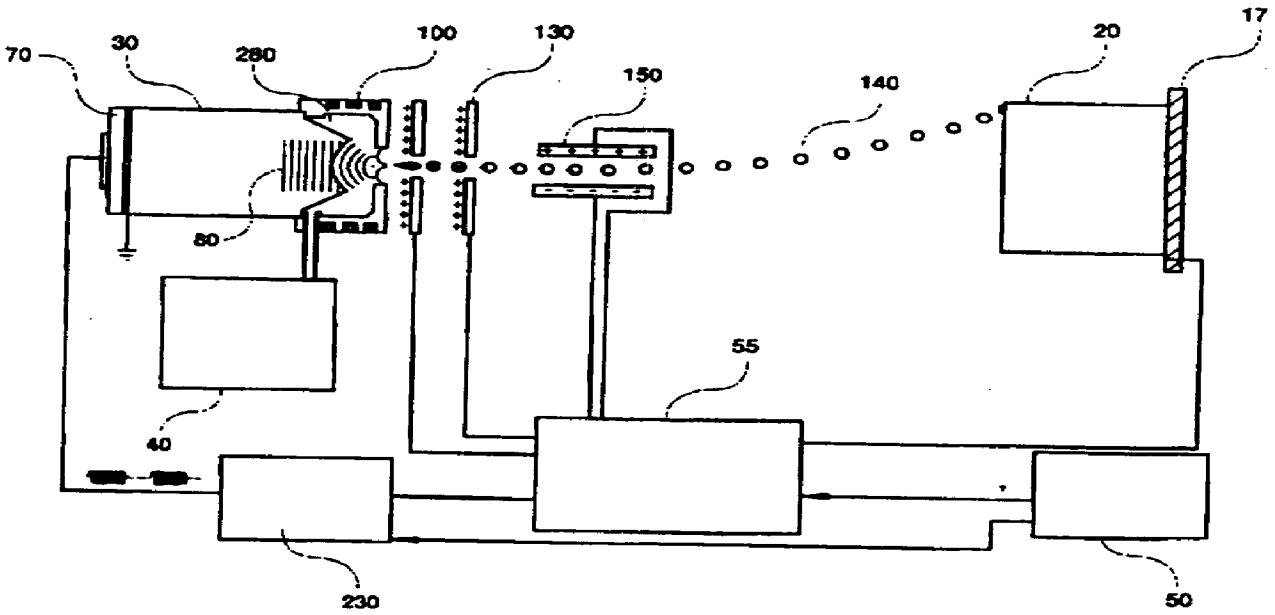


19980203085 NASA Lewis Research Center, Cleveland, OH USA
Directional Electrostatic Accretion Process Employing Acoustic Droplet Formation
Oeftering, Richard, Inventor, NASA Lewis Research Center, USA; Mar. 03, 1998; 21p; In English; Division of US-Patent-Appl-SN-278724, filed 11 Jul. 1994
Patent Info.: Filed 5 Jun. 1995; NASA-Case-LEW-15408-2; US-Patent-5,722,479; US-Patent-Appl-SN-465070; US-Patent-Appl-SN-278724; No Copyright; Avail: US Patent and Trademark Office, Hardcopy, Microfiche

The present invention is directed to an apparatus for manufacturing a free standing solid metal part. In the present invention, metal droplets are ejected in a nozzleless fashion from a free surface pool of molten metal by applying focused acoustic radiation pressure. The acoustic radiation pressure is produced by high intensity acoustic tone bursts emitted from an acoustic source positioned at the bottom of the pool which directs the acoustic energy at the pool surface. The metal droplets are electrostatically charged so their trajectory can be controlled by electric fields that guide the droplets to predetermined points on a target. The droplets impinge upon the target and solidify with the target material. The accretion of the electrostatically directed solidified droplets forms the free standing metal part.

Official Gazette of the U.S. Patent and Trademark Office

Deposition; Metal Surfaces; Manufacturing; Drops (Liquids); Electrostatics



32
COMMUNICATIONS AND RADAR

Includes radar; land and global communications; communications theory; and optical communications. For related information see also 04 Aircraft Communications and Navigation and 17 Space Communications, Spacecraft Communications, Command and Tracking. For search and rescue see 03 Air Transportation and Safety, and 16 Space Transportation.

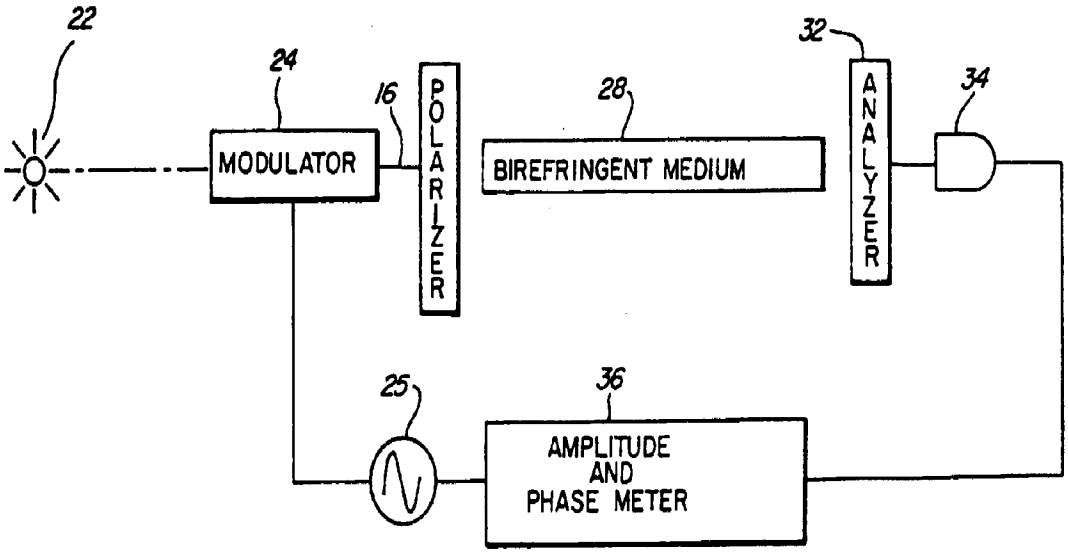
19980202939 NASA Pasadena Office, CA USA

Modulated Source Interferometry with Combined Amplitude and Frequency Modulation

Gutierrez, Roman C., Inventor, Jet Propulsion Lab., California Inst. of Tech., USA; Jan. 06, 1998; 14p; In English; Continuation of abandoned US-Patent-Appl-SN-530386, filed 14 Sep. 1995

Patent Info.: Filed 22 Apr. 1997; NASA-Case-NPO-19418-2; US-Patent-5,706,084; US-Patent-Appl-SN-841478; US-Patent-Appl-SN-530386; No Copyright; Avail: US Patent and Trademark Office, Hardcopy, Microfiche

An improved interferometer is produced by modifying a conventional interferometer to include amplitude and/or frequency modulation of a coherent light source at radio or higher frequencies. The phase of the modulation signal can be detected in an interfering beam from an interferometer and can be used to determine the actual optical phase of the beam. As such, this improvement can be adapted to virtually any two-beam interferometer, including: Michelson, Mach-Zehnder, and Sagnac interferometers. The use of an amplitude modulated coherent tight source results in an interferometer that combines the wide range advantages of coherent interferometry with the precise distance measurement advantages of white light interferometry.
Official Gazette of the U.S. Patent and Trademark Office
Interferometers; Amplitude Modulation; Frequency Modulation; Coherent Light; Interferometry; Light Beams

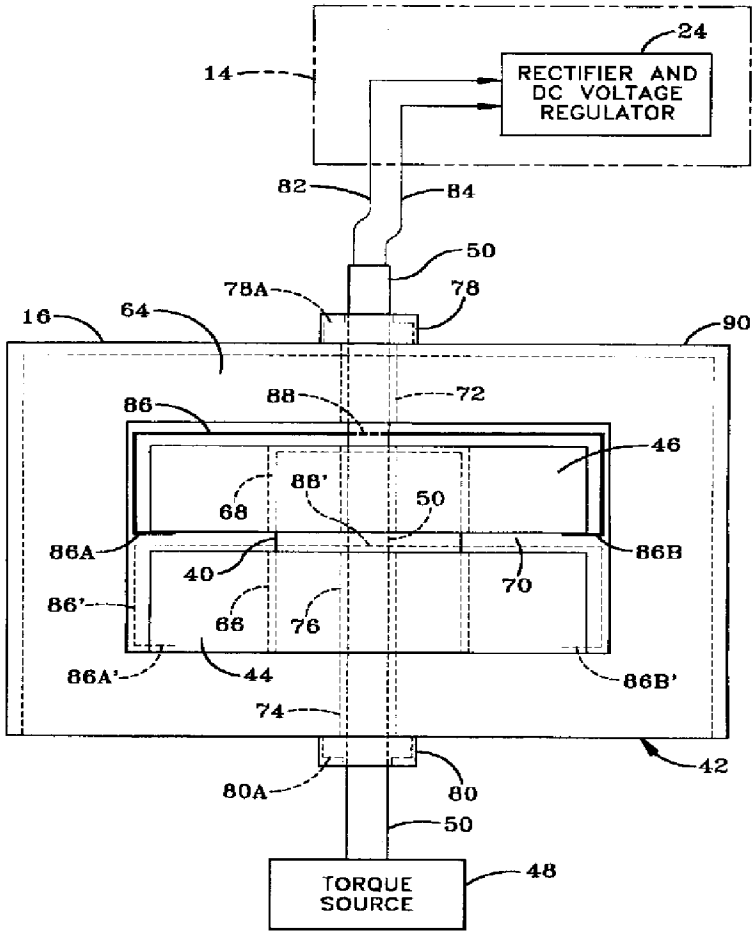


33
ELECTRONICS AND ELECTRICAL ENGINEERING

Includes test equipment and maintainability; components, e.g., tunnel diodes and transistors; microminiaturization; and integrated circuitry. For related information see also 60 Computer Operations and Hardware and 76 Solid-State Physics.

19980203175 NASA Ames Research Center, Moffett Field, CA USA
Contactless Magnetic Slip Ring
Kumagai, Hiroyuki, Inventor, NASA Ames Research Center, USA; Deardon, Joe D., Inventor, NASA Ames Research Center, USA; Nov. 25, 1997; 14p; In English
Patent Info.: Filed 3 Jul. 1995; NASA-Case-ARC-12072-1-LE; US-Patent-5,691,687; US-Patent-Appl-SN-520865; No Copyright; Avail: US Patent and Trademark Office, Hardcopy, Microfiche

A contactless magnetic slip ring is disclosed having a primary coil and a secondary coil. The primary and secondary coils are preferably magnetically coupled together, in a highly reliable efficient manner, by a magnetic layered core. One of the secondary and primary coils is rotatable and the contactless magnetic slip ring provides a substantially constant output.
Official Gazette of the U.S. Patent and Trademark Office
Ring Structures; Electric Contacts; Electric Power Transmission; Electric Coils

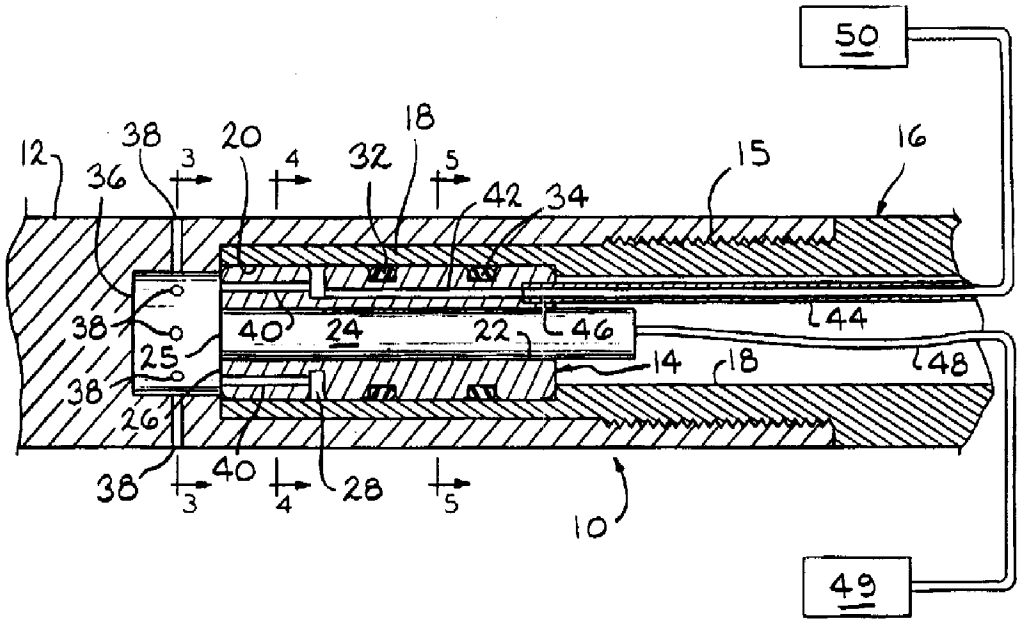


34
FLUID MECHANICS AND HEAT TRANSFER

Includes boundary layers; hydrodynamics; fluidics; mass transfer; and ablation cooling. For related information see also 02 Aerodynamics and 77 Thermodynamics and Statistical Physics.

19980203164 NASA Lewis Research Center, Cleveland, OH USA
Apparatus for Measuring Ambient Pressure within a Gaseous Flow Field
Porro, A. Robert, Inventor, NASA Lewis Research Center, USA; Ernst, Michael A., Inventor, NASA Lewis Research Center, USA; May 26, 1998; 7p; In English
Patent Info.: Filed 27 Feb. 1997; NASA-Case-LEW-16348-1; US-Patent-5,756,892; US-Patent-Appl-SN-813582; No Copyright; Avail: US Patent and Trademark Office, Hardcopy, Microfiche

The invention as disclosed herein teaches apparatus whereby the instantaneous dynamic static pressure and the steady-state static pressure may be simultaneously measured within a supersonic or subsonic gaseous fluid flow field. The dynamic static pressure is measured by an electronic transducer and the steady-state static pressure is measured by pneumatic means.
Official Gazette of the U.S. Patent and Trademark Office
Pressure Measurement; Dynamic Pressure; Static Pressure; Measuring Instruments; Fluid Flow; Flow Distribution



35
INSTRUMENTATION AND PHOTOGRAPHY

Includes remote sensors; measuring instruments and gages; detectors; cameras and photographic supplies; and holography. For aerial photography see 43 Earth Resources and Remote Sensing. For related information see also 06 Aircraft Instrumentation, and 19 Space Instrumentation.

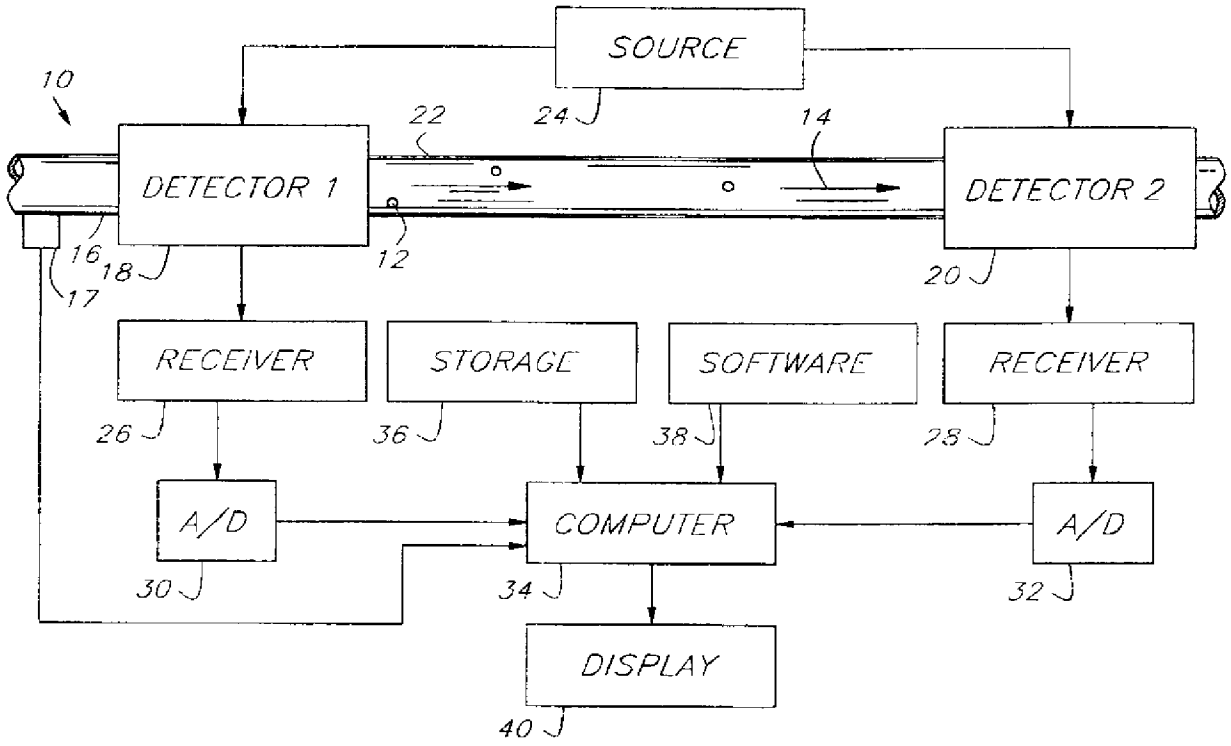
19980203096 NASA Johnson Space Center, Houston, TX USA
Particle Velocity Measuring System
Arndt, G. Dickey, Inventor, NASA Johnson Space Center, USA; Carl, James R., Inventor, NASA Johnson Space Center, USA; Apr. 21, 1998; 13p; In English
Patent Info.: Filed 9 Nov. 1995; NASA-Case-MSC-22451-1; US-Patent-5,741,979; US-Patent-Appl-SN-556241; No Copyright; Avail: US Patent and Trademark Office, Hardcopy, Microfiche

Method and apparatus are provided for determining the velocity of individual food particles within a liquid/solid food mixture that is cooked by an aseptic cooking method whereby the food mixture is heated as it flows through a flowline. At least one upstream and at least one downstream microwave transducer are provided to determine the minimum possible travel time of the fastest food particle through the flowline. In one embodiment, the upstream detector is not required. In another embodiment, a plurality of small dipole antenna markers are secured to a plurality of food particles to provide a plurality of signals as the markers pass the upstream and downstream transducers. The dipole antenna markers may also include a non-linear element to reradiate a harmonic frequency of a transmitter frequency. Upstream and downstream transducers include dipole antennas that are matched

to the impedance of the food slurry and a signal transmission cable by various impedance matching means including unbalanced feed to the antennas.

Official Gazette of the U.S. Patent and Trademark Office

Velocity Measurement; Transducers; Microwave Equipment; Flow Velocity; Food; Solid Solutions; Food Processing; Particles; Multiphase Flow



19980203171 NASA Johnson Space Center, Houston, TX USA

Accelerometer Method and Apparatus for Integral Display and Control Functions

Bozeman, Richard J., Jr., Inventor, NASA Johnson Space Center, USA; Apr. 07, 1998; 7p; In English; Division of US-Patent-Appl-SN-901626, filed 19 Jun. 1992

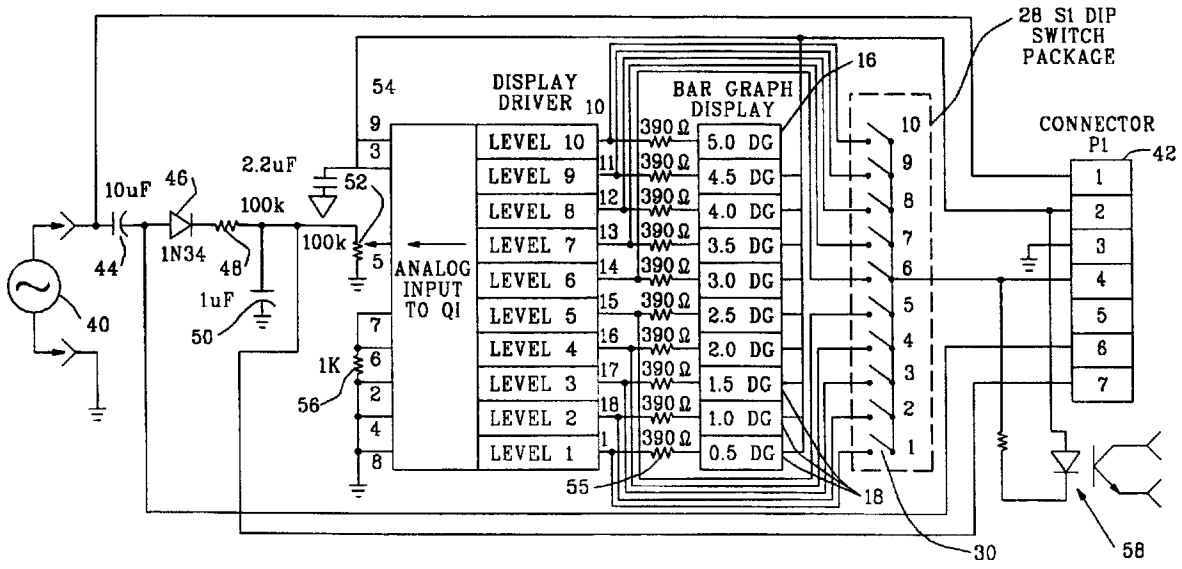
Patent Info.: Filed 16 Nov. 1994; NASA-Case-MSC-21961-2; US-Patent-5,736,970; US-Patent-Appl-SN-342453; US-Patent-Appl-SN-901626; No Copyright; Avail: US Patent and Trademark Office, Hardcopy, Microfiche

Method and apparatus for detecting mechanical vibrations and outputting a signal in response thereto is discussed. An accelerometer package having integral display and control functions is suitable for mounting upon the machinery to be monitored. Display circuitry provides signals to a bar graph display which may be used to monitor machine conditions over a period of time. Control switches may be set which correspond to elements in the bar graph to provide an alert if vibration signals increase in amplitude over a selected trip point. The circuitry is shock mounted within the accelerometer housing. The method provides for outputting a broadband analog accelerometer signal, integrating this signal to produce a velocity signal, integrating and calibrating the

velocity signal before application to a display driver, and selecting a trip point at which a digitally compatible output signal is generated.

Official Gazette of the U.S. Patent and Trademark Office

Accelerometers; Structural Vibration; Vibration Measurement; Signal Detection



19980204847 NASA Johnson Space Center, Houston, TX USA

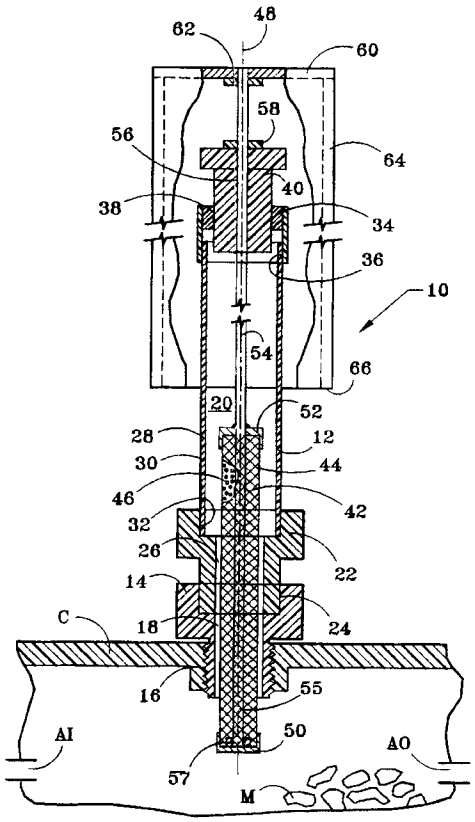
Retractable Visual Indicator Assembly

Hackler, George R., Inventor, NASA Johnson Space Center, USA; Gamboa, Ronald J., Inventor, NASA Johnson Space Center, USA; Dominquez, Victor, Inventor, NASA Johnson Space Center, USA; Mar. 17, 1998; 7p; In English

Patent Info.: Filed 13 Feb. 1996; NASA-Case-MSC-22525-1; US-Patent-5,727,498; US-Patent-Appl-SN-613737; No Copyright; Avail: US Patent and Trademark Office, Hardcopy, Microfiche

A retractable indicator assembly may be mounted on a container which transmits air through the container and removes deleterious gases with an activated charcoal medium in the container. The assembly includes: an elongate indicator housing has a chamber therein; a male adaptor with an external threads is used for sealing engagement with the container; a plug located at the upper end of the housing; a housing that includes a transparent wall portion for viewing at least a portion of the chamber; a litmus indicator, moveable by a retractable rod from a retracted position within the container to an extended position within the chamber of the housing; and an outer housing that is secured to the upper end of the rod, and protects the indicator housing while the litmus indicator is in its normally retracted position. The assembly may be manually manipulated between its extended position wherein

the litmus indicator may be viewed through the transparent wall of the indicator housing, and a retracted position wherein the outer housing encloses the indicator housing and engages the exterior of the container.
Official Gazette of the U.S. Patent and Trademark Office
Contamination; Visual Observation; Activated Carbon; Retractable Equipment; Air Filters; Gas Analysis



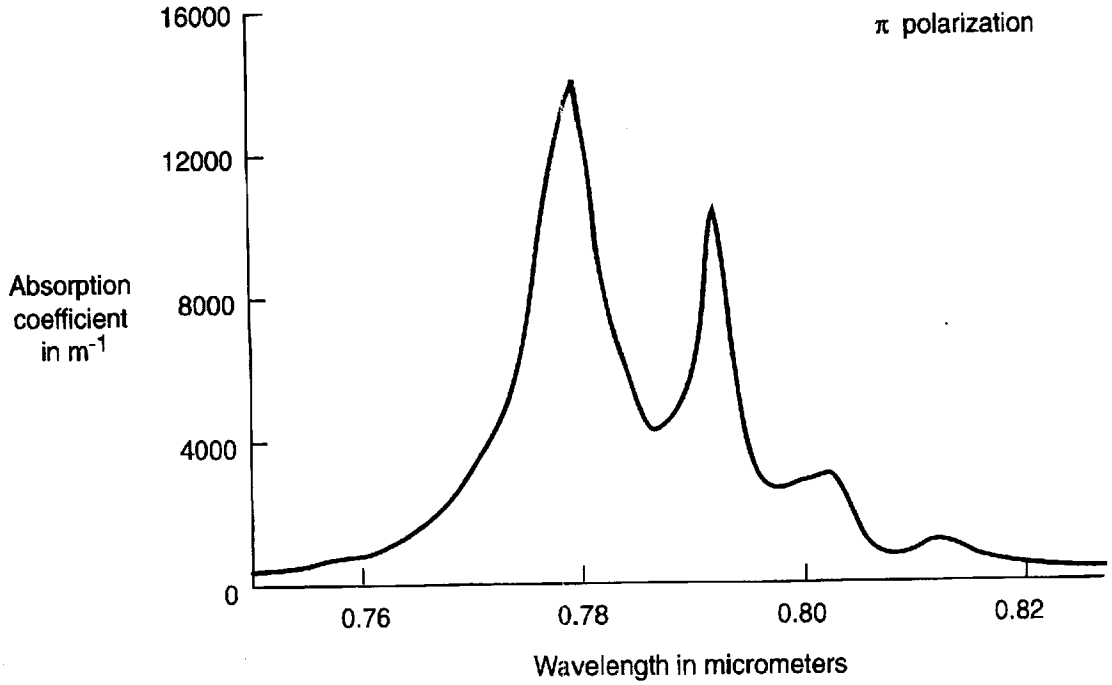
36
LASERS AND MASERS

Includes parametric amplifiers. For related information see also 76 Solid-State Physics.

19980203087 NASA Langley Research Center, Hampton, VA USA
HO:LULF and HO:LULF Laser Materials
Barnes, Norman P., Inventor, NASA Langley Research Center, USA; Morrison, Clyde A., Inventor, NASA Langley Research Center, USA; Filer, Elizabeth D., Inventor, NASA Langley Research Center, USA; Jani, Mahendra G., Inventor, NASA Langley Research Center, USA; Murray, Keith E., Inventor, NASA Langley Research Center, USA; Lockard, George E., Inventor, NASA Langley Research Center, USA; Apr. 21, 1998; 15p; In English
Patent Info.: Filed 7 Sep. 1995; NASA-Case-LAR-15275-1; US-Patent-5,742,632; US-Patent-Appl-SN-524861; No Copyright; Avail: US Patent and Trademark Office, Hardcopy, Microfiche

A laser host material LULF (LuLiF4) is doped with holmium (Ho) and thulium (Tm) to produce a new laser material that is capable of laser light production in the vicinity of 2 microns. The material provides an advantage in efficiency over conventional Ho lasers because the LULF host material allows for decreased threshold and upconversion over such hosts as YAG and YLF. The addition of Tm allows for pumping by commonly available GaAlAs laser diodes. For use with flashlamp pumping, erbium

(Er) may be added as an additional dopant. For further upconversion reduction, the Tm can be eliminated and the Ho can be directly pumped.
Official Gazette of the U.S. Patent and Trademark Office
Laser Materials; Doped Crystals; Lutetium Compounds; Lithium Compounds; Fluorine Compounds; Laser Outputs; Light Beams; Additives



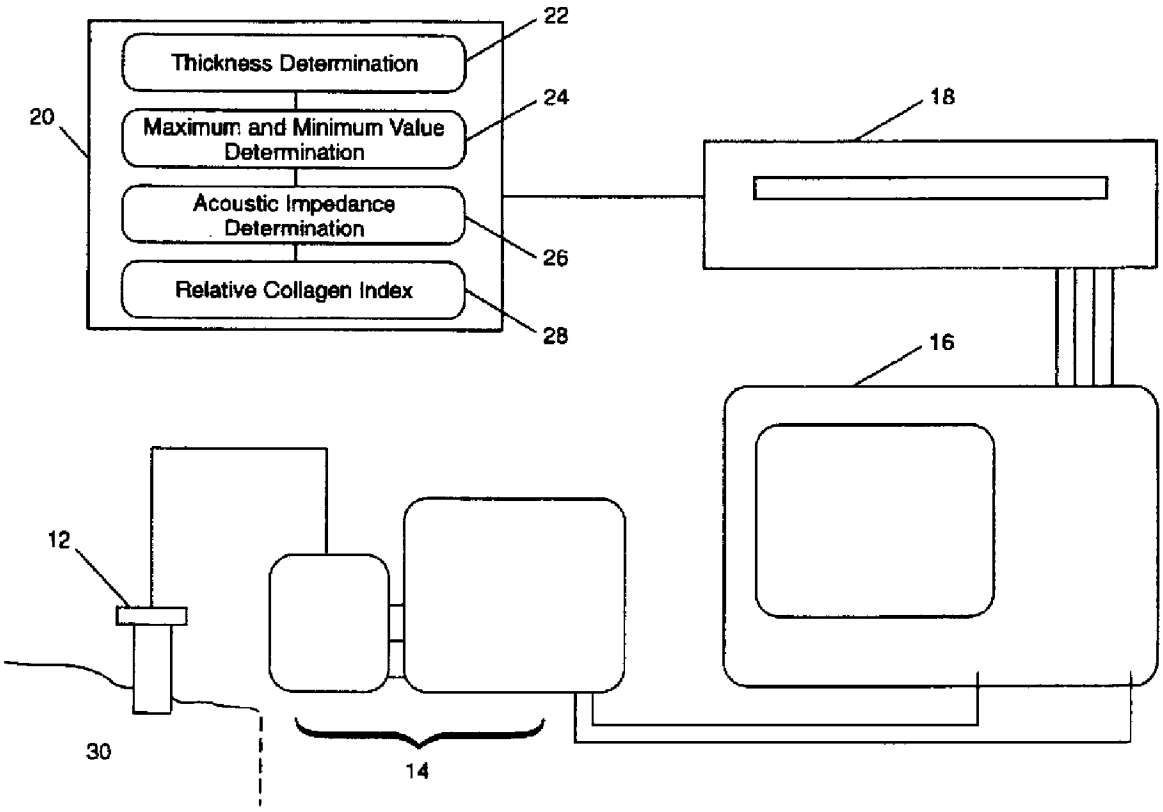
52
AEROSPACE MEDICINE

Includes physiological factors; biological effects of radiation; and effects of weightlessness on man and animals.

19980203088 NASA Langley Research Center, Hampton, VA USA
Method of and Apparatus for Histological Human Tissue Characterization Using Ultrasound
Yost, William T., Inventor, NASA Langley Research Center, USA; Cantrell, John H., Inventor, NASA Langley Research Center, USA; Taler, George A., Inventor, NASA Langley Research Center, USA; May 05, 1998; 10p; In English
Patent Info.: Filed 26 Jan. 1996; NASA-Case-LAR-15040-1; US-Patent-5,746,209; US-Patent-Appl-SN-592833; No Copyright; Avail: US Patent and Trademark Office, Hardcopy, Microfiche

A method and apparatus for determining important histological characteristics of tissue, including a determination of the tissue's health is discussed. Electrical pulses are converted into meaningful numerical representations through the use of Fouri

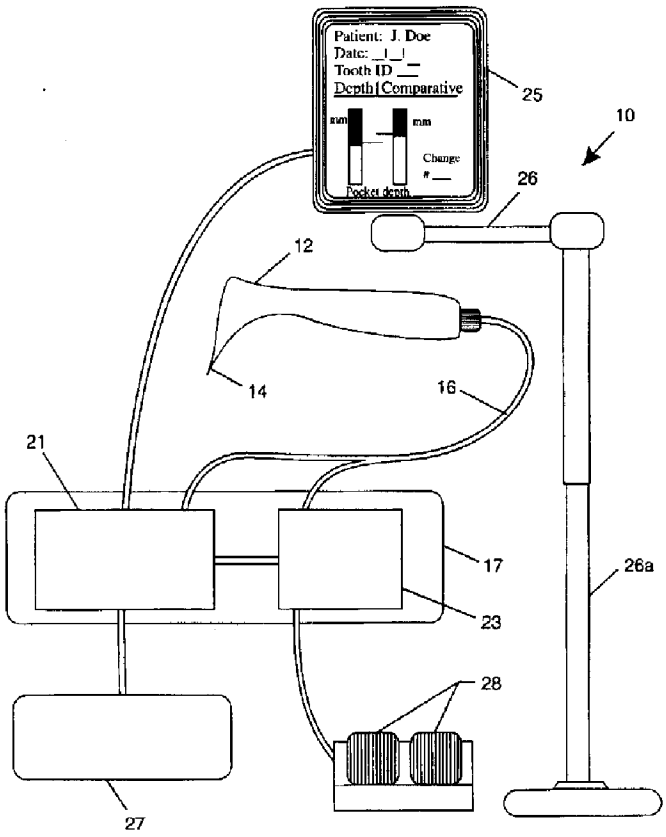
Transforms. These numerical representations are then used to determine important histological characteristics of tissue. This novel invention does not require rectification and thus provides for detailed information from the ultrasonic scan.
Official Gazette of the U.S. Patent and Trademark Office
Tissues (Biology); Fourier Transformation; Histology; Ultrasonics; Histochemical Analysis; Electric Pulses; Health



19980203165 NASA Langley Research Center, Hampton, VA USA
Differential Measurement Periodontal Structures Mapping System
Companion, John A., Inventor, NASA Langley Research Center, USA; May 26, 1998; 15p; In English
Patent Info.: Filed 9 Sep. 1996; NASA-Case-LAR-15282-1; US-Patent-5,755,571; US-Patent-Appl-SN-712984; No Copyright; Avail: US Patent and Trademark Office, Hardcopy, Microfiche

This invention relates to a periodontal structure mapping system employing a dental handpiece containing first and second acoustic sensors for locating the Cemento-Enamel Junction (CEJ) and measuring the differential depth between the CEJ and the bottom of the periodontal pocket. Measurements are taken at multiple locations on each tooth of a patient, observed, analyzed by an optical analysis subsystem, and archived by a data storage system for subsequent study and comparison with previous and subsequent measurements. Ultrasonic transducers for the first and second acoustic sensors are contained within the handpiece and in connection with a control computer. Pressurized water is provided for the depth measurement sensor and a linearly movable probe sensor serves as the sensor for the CEJ finder. The linear movement of the CEJ sensor is obtained by a control computer

actuated by the prober. In an alternate embodiment, the CEJ probe is an optical fiber sensor with appropriate analysis structure provided therefor.
Official Gazette of the U.S. Patent and Trademark Office
Ultrasonic Wave Transducers; Depth Measurement; Dentistry; Acoustics; Surface Acoustic Wave Devices; Signal Detectors



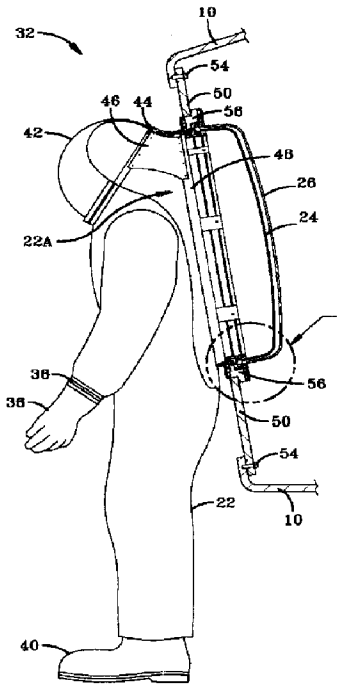
54
MAN/SYSTEM TECHNOLOGY AND LIFE SUPPORT

Includes human engineering; biotechnology; and space suits and protective clothing. For related information see also 16 Space Transportation.

19980203086 NASA Ames Research Center, Moffett Field, CA USA
Suitlock Docking Mechanism
Culbertson, Philip, Jr., Inventor, NASA Ames Research Center, USA; Dec. 16, 1997; 21p; In English
Patent Info.: Filed 30 Sep. 1996; NASA-Case-ARC-14102-1-LE; US-Patent-5,697,108; US-Patent-Appl-SN-730917; No Copyright; Avail: US Patent and Trademark Office, Hardcopy, Microfiche

An environmental protective suit used for hazardous clean-up or space applications includes a suitlock docking mechanism that allows for easy egress and ingress of a crew member between a sealed vessel and a possibly contaminated environment. The suitlock docking mechanism comprises a single actuator that controls latches which, in turn, respectfully control rack and pinion

assemblies that allow for easy removal and attachment of a life support equipment enclosure shell to the environmental protective suit or to the vehicle from which the operator performs his/her duties.
Official Gazette of the U.S. Patent and Trademark Office
Protective Clothing; Mechanical Devices; Locking; Egress; Air Locks



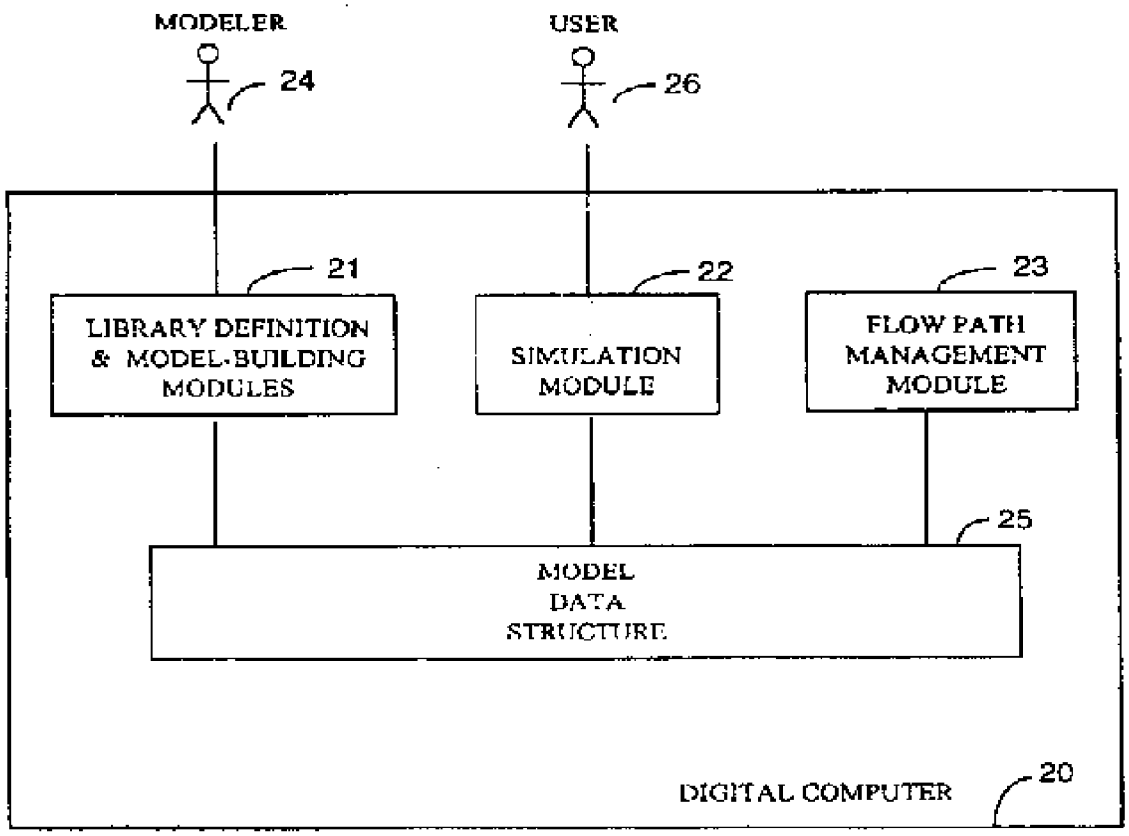
63
CYBERNETICS

Includes feedback and control theory, artificial intelligence, robotics and expert systems. For related information see also 54 Man/System Technology and Life Support.

19980203169 NASA Johnson Space Center, Houston, TX USA
Global Qualitative Flow-Path Modeling for Local State Determination in Simulation and Analysis
Malin, Jane T., Inventor, NASA Johnson Space Center, USA; Fleming, Land D., Inventor, NASA Johnson Space Center, USA; Mar. 24, 1998; 63p; In English
Patent Info.: Filed 30 Nov. 1994; NASA-Case-MSC-22618-1; US-Patent-5,732,192; US-Patent-Appl-SN-346793; No Copyright; Avail: US Patent and Trademark Office, Hardcopy, Microfiche

For qualitative modeling and analysis, a general qualitative abstraction of power transmission variables (flow and effort) for elements of flow paths includes information on resistance, net flow, permissible directions of flow, and qualitative potential is discussed. Each type of component model has flow-related variables and an associated internal flow map, connected into an overall flow network of the system. For storage devices, the implicit power transfer to the environment is represented by "virtual" circuits that include an environmental junction. A heterogeneous aggregation method simplifies the path structure. A method determines global flow-path changes during dynamic simulation and analysis, and identifies corresponding local flow state changes that are effects of global configuration changes. Flow-path determination is triggered by any change in a flow-related device variable in a simulation or analysis. Components (path elements) that may be affected are identified, and flow-related attributes favoring flow in the two possible directions are collected for each of them. Next, flow-related attributes are determined for each affected path element, based on possibly conflicting indications of flow direction. Spurious qualitative ambiguities are minimized by using

relative magnitudes and permissible directions of flow, and by favoring flow sources over effort sources when comparing flow tendencies. The results are output to local flow states of affected components.
Official Gazette of the U.S. Patent and Trademark Office
Mathematical Models; Computerized Simulation; Qualitative Analysis; Power Transmission; Dynamical Systems; Systems Analysis



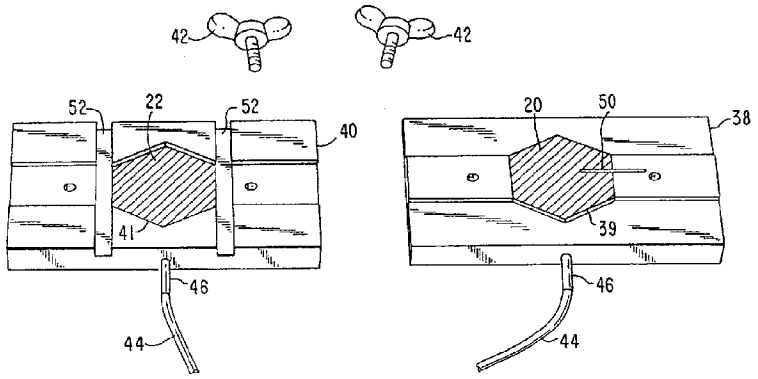
71
ACOUSTICS

Includes sound generation, transmission and attenuation. For noise pollution see 45 Environmental Pollution.

19980203167 NASA Langley Research Center, Hampton, VA USA
Method for Fabricating Piezoelectric Polymer Acoustic Sensors
Hall, Thomas E., Jr., Inventor, NASA Langley Research Center, USA; Bryant, Timothy D., Inventor, NASA Langley Research Center, USA; May 12, 1998; 14p; In English; Division of abandoned US-Patent-Appl-SN-319142, filed 4 Oct. 1994
Patent Info.: Filed 28 Feb. 1996; NASA-Case-LAR-14240-2; US-Patent-5,750,002; US-Patent-Appl-SN-622175; US-Patent-Appl-SN-319142; No Copyright; Avail: US Patent and Trademark Office, Hardcopy, Microfiche

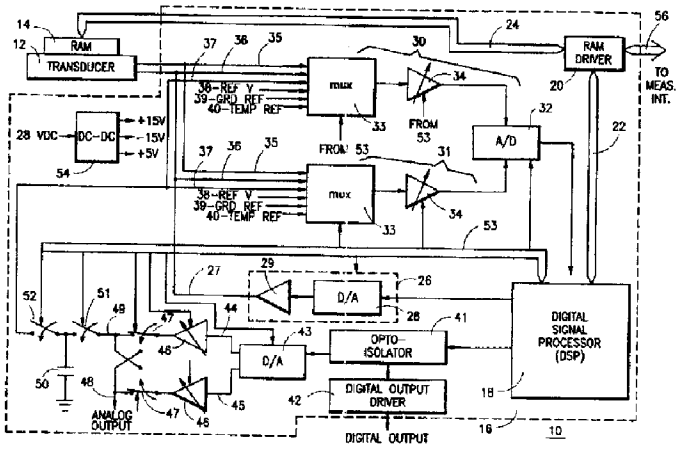
A method for forming a sensor includes providing a first and a second film and bonding an internal connection tab there between. The internal connection tab is positioned between the inner surfaces of the first and second film. Then, a conductive adhe-

sive is applied to either the tab or to the inner film surfaces such that the inner surfaces of the film and the tab are electrically connected. Finally, the films are pressed together to bond the film together with the internal connection tab in between.
Official Gazette of the U.S. Patent and Trademark Office
Piezoelectricity; Fabrication; Acoustics; Sound Transducers; Polymeric Films; Adhesive Bonding



19980203170 NASA Kennedy Space Center, Cocoa Beach, FL USA
Self-Calibrating and Remote Programmable Signal Conditioning Amplifier System and Method
Medelius, Pedro J., Inventor, NASA Kennedy Space Center, USA; Hallberg, Carl G., Inventor, NASA Kennedy Space Center, USA; Simpson, Howard J., III, Inventor, NASA Kennedy Space Center, USA; Thayer, Stephen W., Inventor, NASA Kennedy Space Center, USA; Mar. 31, 1998; 10p; In English; Continuation-in-part of US-Patent-Appl-SN-233583, filed 26 Apr. 1994
Patent Info.: Filed 29 Mar. 1996; NASA-Case-KSC-11688; US-Patent-5,734,596; US-Patent-Appl-SN-624152; US-Patent-Appl-SN-233583; No Copyright; Avail: US Patent and Trademark Office, Hardcopy, Microfiche

A self-calibrating, remote programmable signal conditioning amplifier system employs information read from a memory attached to a measurement transducer for automatic calibration. The signal conditioning amplifier is self-calibrated on a continuous basis through use of a dual input path arrangement, with each path containing a multiplexer and a programmable amplifier. A digital signal processor controls operation of the system such that a transducer signal is applied to one of the input paths, while one or more calibration signals are applied to the second input path. Once the second path is calibrated, the digital signal processor switches the transducer signal to the second path. and then calibrates the first path. This process is continually repeated so that each path is calibrated on an essentially continuous basis. Dual output paths are also employed which are calibrated in the same manner. The digital signal processor also allows the implementation of a variety of digital filters which are either programmed into the system or downloaded by an operator, and performs up to eighth order linearization.
Official Gazette of the U.S. Patent and Trademark Office
Amplifiers; Signal Processing; Digital Filters; Amplifier Design; Calibrating



74
OPTICS

Includes light phenomena; and optical devices. For lasers see 36 Lasers and Masers.

19980203098 NASA Langley Research Center, Hampton, VA USA

Optical Flameout Detector

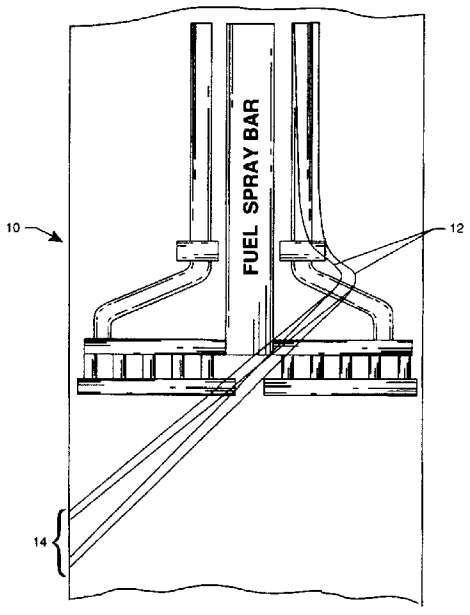
Borg, Stephen E., Inventor, NASA Langley Research Center, USA; West, James W., Inventor, NASA Langley Research Center, USA; Lawrence, Robert M., Inventor, NASA Langley Research Center, USA; Harper, Samuel E., Jr., Inventor, NASA Langley Research Center, USA; Alderfer, David W., Inventor, NASA Langley Research Center, USA; May 05, 1998; 7p; In English; Continuation of abandoned US-Patent-Appl-SN-518853, filed 24 Aug. 1995 which is a continuation of abandoned US-Patent-Appl-SN-141294, filed 19 Oct. 1993

Patent Info.: Filed 16 Jul. 1997; NASA-Case-LAR-14997-3; US-Patent-5,748,090; US-Patent-Appl-SN-892833; US-Patent-Appl-SN-518853; US-Patent-Appl-SN-141294; No Copyright; Avail: US Patent and Trademark Office, Hardcopy, Microfiche

A device has been developed which monitors the presence of a flame within a combustion chamber. The optical flameout detection system responds to gross changes in combustor light intensity which is monitored in two spectral bands. A photomultiplier tube makes optical measurements in the ultraviolet portion of the spectrum and a silicon photodiode covers the visible region. The detectors, located outside the combustion chamber, receive the light energy radiated from the combustion process through fiber optic probes designed to operate in a high pressure environment. The optical fibers are aimed diagonally through the center of the injector at the combustion chamber wall downstream of the injector. The probe observes events occurring within a narrow conical-shaped field of view so that the system can quickly detect longitudinal movement of the flame front away from the injector. If a change in intensity of the flame is detected, the fuel supply to the combustion chamber is shut off limiting the amount of unburned fuel in the combustion chamber which could reignite.

Official Gazette of the U.S. Patent and Trademark Office

Photomultiplier Tubes; Photodiodes; Flameout; Combustion Chambers; Optical Measuring Instruments



Includes superconductivity. For related information, see also 33 Electronics and Electrical Engineering and 36 Lasers and Masers.

19980203099 NASA Pasadena Office, CA USA

Buried Porous Silicon-Germanium Layers in Monocrystalline Silicon Lattices

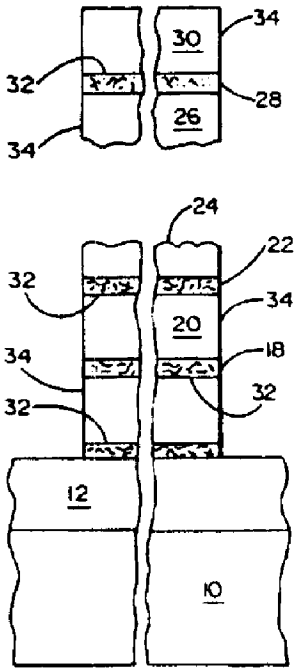
Fathauer, Robert W., Inventor, Jet Propulsion Lab., California Inst. of Tech., USA; George, Thomas, Inventor, Jet Propulsion Lab., California Inst. of Tech., USA; Jones, Eric W., Inventor, Jet Propulsion Lab., California Inst. of Tech., USA; May 26, 1998; 10p; In English; Division of US-Patent-Appl-SN-390456, filed 15 Feb. 1995 which is a continuation of abandoned US-Patent-Appl-SN-105728, filed 11 Aug. 1993

Patent Info.: US-Patent-5,757,024; US-Patent-Appl-SN-695322; US-Patent-Appl-SN-390456; US-Patent-Appl-SN-105728; No Copyright; Avail: US Patent and Trademark Office, Hardcopy, Microfiche

Monocrystalline semiconductor lattices with a buried porous semiconductor layer having different chemical composition is discussed and monocrystalline semiconductor superlattices with a buried porous semiconductor layers having different chemical composition than that of its monocrystalline semiconductor superlattice are discussed. Lattices of alternating layers of monocrystalline silicon and porous silicon-germanium have been produced. These single crystal lattices have been fabricated by epitaxial growth of Si and Si-Ge layers followed by patterning into mesa structures. The mesa structures are strain etched resulting in porosification of the Si-Ge layers with a minor amount of porosification of the monocrystalline Si layers. Thicker Si-Ge layers produced in a similar manner emitted visible light at room temperature.

Official Gazette of the U.S. Patent and TrademarkOffice

Semiconductor Devices; Porous Silicon; Germanium; Fabrication; Single Crystals; Superlattices; Epitaxy



Subject Term Index

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LICENSES FOR COMMERCIAL USE: INQUIRIES AND APPLICATIONS FOR LICENSE

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The NASA Patent Counsel having cognizance of the invention is determined by the first three letters or prefix of the NASA Case Number assigned to the invention. The addresses of NASA Patent Counsels are listed alongside the NASA Case Number prefix letters in the following table.

NASA Case Number Prefix Letters	Address of Cognizant NASA Patent Counsel
ARC-xxxxx XAR-xxxxx	Ames Research Center Mail Code: 200-11A Moffett Field, California 94035 Telephone: (415) 694-5104
ERC-xxxx XER-xxxxx HQN-xxxxx XHQ-xxxxx	NASA Headquarters Mail Code: GP Washington, DC 20546 Telephone: (202) 358-2066
GSC-xxxxx XGS-xxxxx	Goddard Space Flight Center Mail Code: 204 Greenbelt, Maryland 20771 Telephone: (301) 286-7351
KSC-xxxxx XKS-xxxxx	John F. Kennedy Space Center Mail Code: PT-PAT Kennedy Space Center, Florida 32899 Telephone: (305) 867-2544
LAR-xxxxx XLA-xxxxx	Langley Research Center Mail Code: 279 Hampton, Virginia 23365 Telephone: (804) 865-3725
LEW-xxxxx XLE-xxxxx	Lewis Research Center Mail Code: 500-318 21000 Brookpark Road Cleveland, Ohio 44135 Telephone: (216) 433-5753
MSC-xxxxx XMS-xxxxx	Lyndon B. Johnson Space Center Mail Code:-AL3 Houston, Texas 77058 Telephone: (713) 483-4871
MFS-xxxxx XMF-xxxxx	George C. Marshall Space Flight Center Mail Code: CC01 Huntsville, Alabama 35812 Telephone: (205) 544-0024
NPO-xxxxx XNP-xxxxx DRC-xxxxx FRC-xxxxx XFR-xxxxx WOO-xxxxx	NASA Resident Legal Office Mail Code: 180-801 4800 Oak Grove Drive Pasadena, California 91103 Telephone: (818) 354-2700 Dryden Flight Research Center Mail Code: 4839A Edwards, California 93523-0273 Telephone: (805) 258-3720

PATENT LICENSING REGULATIONS

NATIONAL AERONAUTICS AND SPACE ADMINITRATION
14 CFR Part 1245
Patents and Other Intellectual Property Rights

AGENCY: National Aeronautics and Space Administration (NASA).

Action: Final rule.

SUMMARY: NASA is amending 14 CFR Part 1245 by removing Subpart 2, "Licensing of NASA Inventions." The Department of Commerce has issued similar regulations which prescribe the terms, conditions, and procedures upon which a federally–owned invention may be licensed. These regulations are codified at 37 CFR Part 404, *"Licensing of Government Owned Inventions."* NASA began granting licenses in accordance with the Department of Commerce regulations on March 13, 1995. All licenses agreements executed prior to this date will operate under the previous regulations.

EFFECTIVE DATE: March 13, 1995.

FOR FURTHER INFORMATION CONTACT:
John G. Mannix, (202) 358–2424.

List of Subjects in 14 CFR Part 1245
Authority delegations (Government agencies), Inventions and patents.

Under the authority, 42 U.S.C. 2473, 14 CFR Part 1245 is amended as follows:

PART 1245 — [AMENDED]

Subpart 2 — [Removed and Reserved]

In 14 CFR Part 1245, Subpart 2 (consisting of SS 1245.200 through 1245.214) is removed and reserved.

Dated: April 24,1995.

Edward A. Frankle,
General Counsel.

[FR Doc. 95 10583 Filed 4–28–95, 8:45 am]

BILLING CODE 7510 01 M

Code of Federal Regulations 37
CFR Part 404
Licensing of Government Owned Inventions

Sec.

Sec. 404.1 Scope of part.

This part prescribes the terms, conditions, and procedures upon which a federally owned invention, other than an invention in the custody of the Tennessee Valley Authority, may be licensed. It supersedes the regulations at 41 CFR Subpart 101–4.1. This part does not affect licenses which (a) were in effect prior to July 1, 1981; (b) may exist at the time of the Government's acquisition of title to the invention, including those resulting from the allocation of rights to inventions made under Government research and development contracts; (c) are the result of an authorized exchange of rights in the settlement of patent disputes; or (d) are otherwise authorized by law or treaty.

Sec. 404.2 Policy and objective.

It is the policy and objective of this subpart to use the patent system to promote the utilization of inventions arising from federally supported research or development.

Sec. 404.3 Definitions.

(a) *'Federally owned invention'* means an invention, plant, or design which is covered by a patent, or patent application in the United States, or a patent, patent application, plant variety protection, or other form of protection, in a foreign country, title to which has been assigned to or otherwise vested in the United States Government.

(b) *'Federal agency'* means an executive department, military department, Government corporation, or independent establishment, except the Tennessee Valley Authority, which has custody of a federally owned invention.

(c) *'Small business firm'* means a small business concern as defined in section 2 of Pub. L. 85–536 (15 U.S.C. 632) and implementing regulations of the Administrator of the Small Business Administration.

(d) *'Practical application'* means to manufacture in the case of a composition or product, to practice in the case of a process or method, or to operate in the case of a machine or system; and, in each case, under such conditions as to establish that the invention is being utilized and that its benefits are to the extent permitted by law or Government regulations available to the public on reasonable terms.

(e) *'United States'* means the United States of America, its territories and possessions, the District of Columbia, and the Commonwealth of Puerto Rico.

Sec. 404.4 Authority to grant licenses.

Federally owned inventions shall be made available for licensing as deemed appropriate in the public interest. Federal agencies having custody of federally owned inventions may grant nonexclusive, partially exclusive, or exclusive licenses thereto under this part.

Sec. 404.5 Restrictions and conditions on all licenses granted under this part.

(a) (1) A license may be granted only if the applicant has supplied the Federal agency with a satisfactory plan for development or marketing of the invention, or both, and with information about the applicant's capability to fulfill the plan.

(2) A license granting rights to use or sell under a federally owned invention in the United States shall normally be granted only to a licensee who agrees that any products embodying the invention or produced through the use of the invention will be manufactured substantially in the United States.

(b) Licenses shall contain such terms and conditions as the Federal agency determines are appropriate for the protection of the interests of the Federal Government and the public and are not in conflict with law or this part. The following terms and conditions apply to any license:

(1) The duration of the license shall be for a period specified in the license agreement unless sooner terminated in accordance with this part.

(2) The license may be granted for all or less than all fields of use of the invention or in specified geographical areas, or both.

(3) The license may extend to subsidiaries of the licensee or other parties if provided for in the license but shall be nonassignable without approval of the Federal agency, except to the successor of that part of the licensee's business to which the invention pertains.

(4) The licensee may provide the license the right to grant sublicenses under the license, subject to the approval of the Federal agency. Each sublicense shall make reference to the license, including the rights retained by the Government, and a copy of such sublicense shall be furnished to the Federal agency.

(5) The license shall require the licensee to carry out the plan for development or marketing of the invention, or both, to bring the invention to practical application within a period specified in the license, and to continue to make the benefits of the invention reasonably accessible to the public.

(6) The license shall require the licensee to report periodically on the utilization or efforts at obtaining utilization that are being made by the licensee, with particular reference to the plan submitted.

(7) Licenses may be royalty–free or for royalties or other consid–eration.

(8) Where an agreement is obtained pursuant to Sec.404.5(a) (2) that any products embodying the invention or produced through use of the invention will be manufactured substantially in the United States, the license shall recite such agreement.

(9) The license shall provide for the right of the Federal agency to terminate the license, in whole or in part, if:

(i) The Federal agency determines that the licensee is not executing the plan submitted with its request for a license and the licensee cannot otherwise demonstrate to the satisfaction of the Federal agency that it has taken or can be expected to take within a reasonable time effective steps to achieve practical application of the invention;

(ii) The Federal agency determines that such action is necessary to meet requirements for public use specified by Federal regulations issued after the date of the license and such requirements are not reasonably satisfied by the licensee;

(iii) The licensee has willfully made a false statement of or willfully omitted a material fact in the license application or in any report required by the license agreement; or

(iv) The licensee commits a substantial breach of a covenant or agreement contained in the license.

(10) The license may be modified or terminated, consistent with this part, upon mutual agreement of the Federal agency and the licensee.

(11) Nothing relating to the grant of a license, nor the grant itself, shall be construed to confer upon any person any immunity from or defenses under the antitrust laws or from a charge of patent misuse, and the acquisition and use of rights pursuant to this part shall not be immunized from the operation of state or Federal law by reason of the source of the grant.

Sec. 404.6 Nonexclusive licenses.

(a) Nonexclusive licenses may be granted under federally owned inventions without publication of availability or notice of a prospective license.

(b) In addition to the provisions of Sec. 404.5, the nonexclusive license may also provide that, after termination of a period specified in the license agreement, the Federal agency may restrict the license to the fields of use or geographic areas, or both, in which the licensee has brought the invention to practical application and continues to make the benefits of the invention reasonably accessible to the public. However, such restriction shall be made only in order to grant an exclusive or partially exclusive license in accordance with this subpart.

Sec. 404.7 Exclusive and partially exclusive licenses.

(a) (1) Exclusive or partially exclusive domestic licenses may be granted on federally owned inventions three months after notice of the invention's availability has been announced in the Federal Register, or without such notice where the Federal agency determines that expeditious granting of such a license will best serve the interest of the Federal Government and the public; and in either situation, only if;

(i) Notice of a prospective license, identifying the invention and the prospective licensee, has been published in the Federal Register, providing opportunity for filing written objections within a 60–day period;

(ii) After expiration of the period in Sec. 404.7(a)(1)(i) and consideration of any written objections received during the period, the Federal agency has determined that;

(A) The interests of the Federal Government and the public will best be served by the proposed license, in view of the applicant's intentions, plans, and ability to bring the invention to practical application or otherwise promote the invention's utilization by the public;

(B) The desired practical application has not been achieved, or is not likely expeditiously to be achieved, under any nonexclusive license which has been granted, or which may be granted, on the invention;

(C) Exclusive or partially exclusive licensing is a reasonable and necessary incentive to call forth the investment of risk capital and expenditures to bring the invention to practical application or otherwise promote the invention's utilization by the public; and

(D) The proposed terms and scope of exclusivity are not greater than reasonably necessary to provide the incentive for bringing the invention to practical application or otherwise promote the invention's utilization by the public;

(iii) The Federal agency has not determined that the grant of such license will tend substantially to lessen competition or result in undue concentration in any section of the country in any line of commerce to which the technology to be licensed relates, or to create or maintain other situations inconsistent with the antitrust laws; and

(iv) The Federal agency has given first preference to any small business firms submitting plans that are determined by the agency to be within the capabilities of the firms and as equally likely, if executed, to bring the invention to practical application as any plans submitted by applicants that are not small business firms.

(2) In addition to the provisions of Sec. 404.5, the following terms and conditions apply to domestic exclusive and partially exclusive licenses;

(i) The license shall be subject to the irrevocable, royalty–free right of the Government of the United States to practice and have practiced the invention on behalf of the United States and on behalf of any foreign government or international organization pursuant to any existing or future treaty or agreement with the United States.

(ii) The license shall reserve to the Federal agency the right to require the licensee to grant sublicenses to responsible applicants, on reasonable terms, when necessary to fulfill health or safety needs.

(iii) The license shall be subject to any licenses in force at the time of the grant of the exclusive or partially exclusive license.

(iv) The license may grant the licensee the right of enforcement of the licensed patent pursuant to the provisions of Chapter 29 of Title 35, United States Code, or other statutes, as determined appropriate in the public interest.

(b) (1) Exclusive or partially exclusive licenses may be granted on a federally owned invention covered by a foreign patent, patent application, or other form of protection, provided that;

(i) Notice of a prospective license, identifying the invention and prospective licensee, has been published in the Federal Register, providing opportunity for filing written objections within a 60–day period and following consideration of such objections;

(ii) The agency has considered whether the interests of the Federal Government or United States industry in foreign commerce will be enhanced; and

(iii)The Federal agency has not determined that the grant of such license will tend substantially to lessen competition or result in undue concentration in any section of the United States in any line of commerce to which the technology to be licensed relates, or to create or maintain other situations inconsistent with antitrust laws.

(2) In addition to the provisions of Sec. 404.5 the following terms and conditions apply to foreign exclusive and partially exclusive licenses:

(i) The license shall be subject to the irrevocable, royalty–free right of the Government of the United States to practice and have practiced the invention on behalf of the United States and on behalf of any foreign government or international organization pursuant to any existing or future treaty or agreement with the United States.

(ii) The license shall be subject to any licenses in force at the time of the grant of the exclusive or partially exclusive license.

(iii)The license may grant the licensee the right to take any suitable and necessary actions to protect the licensed property, on behalf of the Federal Government.

(c) Federal agencies shall maintain a record of determinations to grant exclusive or partially exclusive licenses.

Sec. 404.8 Application for a license.

An application for a license should be addressed to the Federal agency having custody of the invention and shall normally include:

(a) Identification of the invention for which the license is desired including the patent application serial number or patent number, title, and date, if known;

(b) Identification of the type of license for which the application is submitted;

(c) Name and address of the person, company, or organization applying for the license and the citizenship or place of incorporation of the applicant;

(d) Name, address, and telephone number of the representative of the applicant to whom correspondence should be sent;

(e) Nature and type of applicant's business, identifying products or services which the applicant has successfully commercialized, and approximate number of applicant's employees;

(f) Source of information concerning the availability of a license on the invention;

(g) A statement indicating whether the applicant is a small business firm as defined in Sec.404.3(c)

(h) A detailed description of applicant's plan for development or marketing of the invention, or both, which should include:

(1) A statement of the time, nature and amount of anticipated investment of capital and other resources which applicant believes will be required to bring the invention to practical application;

(2) A statement as to applicant's capability and intention to fulfill the plan, including information regarding manufacturing, marketing, financial, and technical resources;

(3) A statement of the fields of use for which applicant intends to practice the invention; and

(4) A statement of the geographic areas in which applicant intends to manufacture any products embodying the invention and geographic areas where applicant intends to use or sell the invention, or both;

(i) Identification of licenses previously granted to applicant under federally owned inventions;

(j) A statement containing applicant's best knowledge of the extent to which the invention is being practiced by private industry or Government, or both, or is otherwise available commercially; and

(k) Any other information which applicant believes will support a determination to grant the license to applicant.

Sec. 404.9 Notice to Attorney General.

A copy of the notice provided for in Sec. 404.7(a)(1)(i) and (b)(1)(i) will be sent to the Attorney General.

Sec. 404.10 Modification and termination of licenses.

Before modifying or terminating a license, other than by mutual agreement, the Federal agency shall furnish the licensee and any sublicensee of record a written notice of intention to modify or terminate the license, and the licensee and any sublicensee shall be allowed 30 days after such notice to remedy any breach of the license or show cause why the license shall not be modified or terminated.

Sec. 404.11 Appeals.

In accordance with procedures prescribed by the Federal agency, the following parties may appeal to the agency head or designee any decision or determination concerning the grant, denial, interpretation, modification, or termination of a license:

(a) A person whose application for a license has been denied.

(b) A licensee whose license has been modified or terminated, in whole or in part; or

(c) A person who timely filed a written objection in response to the notice required by Sec. 404.7(a)(1)(i) or Sec. 404.7(b)(1)(i) and who can demonstrate to the satisfaction of the Federal agency that such person may be damaged by the agency action.

Sec. 404.12 Protection and administration of inventions.

A Federal agency may take any suitable and necessary steps to protect and administer rights to federally owner inventions, either directly or through contract.

Sec. 404.13 Transfer of custody.

A Federal agency having custody of a federally owned invention may transfer custody and administration, in whole or in part, to another Federal agency, of the right, title, or interest in such invention.

Sec. 404.14 Confidentiality of information.

Title 35, United States Code, section 209, provides that any plan submitted pursuant to Sec. 404.8 (h) and any report required by Sec. 404.5(b)(6) may be treated by the Federal agency as commercial and financial information obtained from a person and privileged and confidential and not subject to disclosure under section 552 of Title 5 of the United States Code.

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